

Express Mail No. EV504793454US

9D-HR-19412-Holmes et al.
PATENTIN THE CLAIMS

1. (currently amended) A method for detecting an open door of a ~~refrigerator door, refrigerator,~~ the refrigerator including at least one door including a first door, at least one switch including a first switch configured to be activated by opening of said first door, and at least one detection circuit including at least one phase shift circuit coupled to an opto-coupler and a processor, said method comprising the steps of:

receiving a signal from said first switch when said first switch is activated;

phase-shifting the signal;

feeding the phase-shifted signal to the ~~processor, and~~ processor;

monitoring an output signal from the opto-coupler; and

comparing said output signal with a line signal to determine whether the first door ~~is open--~~ is open.

2. (original) A method in accordance with Claim 1 wherein said step of phase-shifting the signal comprises the steps of:

rectifying the signal; and

phase-shifting the rectified signal.

3. (original) A method in accordance with Claim 2 wherein said step of rectifying the signal comprises the step of half-wave rectifying the signal.

4. (original) A method in accordance with Claim 2 wherein said step of phase-shifting the rectified signal comprises the step of producing a shifted voltage leading a line voltage.

5. (original) A method in accordance with Claim 4 wherein the shifted voltage leads the line voltage by a lead value between zero degrees and 90 degrees.

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6. (original) A method in accordance with Claim 2 wherein said step of phase-shifting the rectified signal comprises the step of producing a shifted voltage lagging a line voltage.

7. (original) A method in accordance with Claim 6 wherein the shifted voltage lags the line voltage by a lag value between zero degrees and -90 degrees.

8. (currently amended) A method in accordance with Claim 1 wherein the refrigerator includes a plurality of doors included within the at least one door and includes corresponding switches included within the at least one switch, said method further comprising the steps of:

~~receiving a signal~~ a plurality of signals from ~~each respective switch~~ the switches when ~~each switch is~~ the switches are activated;

~~phase-shifting the signal~~ signals from ~~each respective switch~~ the switches;

~~mixing the phase-shifted signals~~ for the ~~respective~~ switches; and

supplying the mixed signal to a processor.

9. (original) A method in accordance with Claim 8 wherein said step of supplying the mixed signal to a processor comprises the step of isolating the mixed signal using an opto-coupler.

10. (original) A method in accordance with Claim 8 wherein further comprising the steps of:

converting a value in degrees of phase shifting of the mixed signal to a time value; and

determining which of the doors is open using the time value.

11. (original) A method in accordance with Claim 8 further comprising the step of shifting a phase of a signal output by one activated switch to a degree different in magnitude from a degree of shift of another switch signal output.

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12. (currently amended) A method in accordance with Claim 8 wherein said steps of phase shifting the signals from the switches and mixing the phase-shifted signals are performed using a single component.

13. (currently amended) An apparatus for detecting refrigerator door openings, the refrigerator including at least one switch configured to be activated by a door opening, said apparatus configured to:

phase-shift a signal output by an activated ~~switch~~; and switch;

determine whether a door is open using the shifted ~~signal~~; signal; and

provide the shifted signal to a microcontroller.

14. (original) An apparatus in accordance with Claim 13 wherein said apparatus is further configured to rectify the signal; and phase-shift the rectified signal.

15. (original) An apparatus in accordance with Claim 14 further configured to half-wave rectify the signal.

16. (original) An apparatus in accordance with Claim 14 further configured to produce a shifted voltage leading a line voltage.

17. (original) An apparatus in accordance with Claim 16 further configured to produce a shifted voltage leading the line voltage by a lead value between zero degrees and 90 degrees.

18. (original) An apparatus in accordance with Claim 14 further configured to produce a shifted voltage lagging a line voltage.

19. (original) An apparatus in accordance with Claim 18 further configured to produce a shifted voltage lagging the line voltage by a lag value between zero degrees and -90 degrees.

20. (currently amended) An apparatus ~~in accordance with Claim 13~~ wherein for detecting refrigerator door openings of a refrigerator, the refrigerator

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~~includes~~including a plurality of doors and corresponding switches configured to be activated by the refrigerator door openings, said apparatus ~~further~~ configured to:

phase-shift signals output by activated switches;

determine whether the doors are open by using the phase-shifted signals;

mix the phase-shifted signals output by the activated switches to generate a mixed signal; and

supply the mixed signal to a processor.

21. (original) An apparatus in accordance with Claim 20 further configured to isolate the mixed signal using an opto-coupler.

22. (original) An apparatus in accordance with Claim 20 further configured to:

convert a value in degrees of phase shifting of the mixed signal to a time value; and

determine which of the doors is open using the time value.

23. (original) An apparatus in accordance with Claim 20 further configured to shift a phase of a signal output by one activated switch to a degree different in magnitude from a degree of shift of another switch signal output.

24. (original) An apparatus in accordance with Claim 20 further comprising a single component configured to phase shift and mix the phase-shifted signals.